CONTENTS

JANUARY 1, 1938

Edward Leamington Nichols . . . . . ERNEST MERRITT 1
Nuclear Disintegrations Produced by Cosmic Rays . ROBERT B. BRODE AND MERLE A. STARR 3
Production of Cosmic-Ray Showers in Lead . . . . . MERLE A. STARR 6
Latitude Effect in Cosmic Radiation at High Altitudes . . . . . S. A. KORFF, L. F. CURTISS AND A. V. ASTIN 14
Cosmic-Ray Observations in the Stratosphere . . . . . L. F. CURTISS, A. V. ASTIN, L. L. STOCKMANN, B. W. BROWN AND S. A. KORFF 23
Collisions of Alpha-Particles with Neon and Deuterium Nuclei . . . JOHN T. MCCARTHY 30
Artificial Radioactivity of Tantalum . . . . . O. OLDENBERG 35
Oppenheimer-Phillips Process . . . . . H. A. BETHE 39
New Method for Investigating Atomic Electron Velocities . . . . . A. L. HUGHES AND MARVIN M. MANN, JR. 50
Atomic Masses of the Heavy Elements . . . . . A. J. DEMPSTER 64
Recombination of Ions in Pure Oxygen as a Function of Pressure and Temperature . . . . . MILTON E. GARDNER 75
Variation of Magnetic Double Refraction with Temperature in Acetone and Certain Acetic Esters . . . . . JOHN B. HAWKES 84
Internal Friction in Solids. II. General Theory of Thermoelastic Internal Friction . . . . . CLARENCE ZENER 90
Internal Friction in Solids. III. Experimental Demonstration of Thermoelastic Internal Friction . . . . . C. ZENER, W. OTIS AND R. NUCKOLLS 100

Letters to the Editor:

Penetrating Cosmic-Ray Particles . . . . . SETH H. NEDDERMEYER 102
Multivibrator Geiger Counter Circuit . . . . . I. A. GETTING 103
Radioactive Isotopes of Zinc and Cobalt . . . . . C. PERRIER, M. SANTANGELO AND E. SEGRÈ 104
Demagnetization Coefficient of Oblate Spheroids . . . . . L. P. TARASOV 105
Zeeman Effect of the p^5d Configurations of Neon and Argon . . . . . J. B. GREEN, J. A. PEOPLES, JR. AND B. FRIED 105
Heavy Particles and the Neutrino . . . . . G. E. M. JAUNCEY 106

Proceedings of the Metropolitan Section of the American Physical Society, October 29, 1937 . 107
Proceedings of the New England Section of the American Physical Society, October 23, 1937; Minutes and Abstracts 107

JANUARY 15, 1938

Latitude Effect for Cosmic-Ray Showers . . . . . H. V. NEHER AND W. H. PICKERING 111
Radioactivity in Silver Induced by Fast Neutrons . . . . . M. L. POOL 116
Radiations Emitted from Artificially Produced Radioactive Substances. IV. Further Studies on the Gamma-Rays from Several Elements . . . . . J. REGINALD RICHARDSON 124
Experiments with a Condenser Discharge X-Ray Tube . K. H. KINGDON AND H. E. TANIS, JR. 128
Further Study of X-Ray Diffraction in Quartz . . . . G. W. FOX AND J. R. FREDERICK 135
Mass Ratio of the Carbon Isotopes from the Spectrum of Cn . . . . . F. A. JENKINS AND DEAN E. WOOLDRIDGE 137
Band Spectra of PbSe, SnSe and PbTe in Absorption . . . . . J. W. WALKER, J. W. STRALEY AND ALPHEUS W. SMITH 140
Spectrum of the Arc in Hydrogen . . . . . R. W. WOOD AND G. H. DIEKE 146
Approximately Relativistic Equations . . . . . G. BREIT 153
On Multiple Scattering of Neutrons. I. Theory of the Albedo of a Plane Boundary . . . . . O. HALPERN, R. LUENEBURG AND O. CLARK 173
Energy Distribution of Photoelectrons from Sodium . . . . . A. G. HILL 184
Energy Flux of the Corpuscular Cosmic Radiation . . . . . C. G. MONTGOMERY AND D. D. MONTGOMERY 193

Letters to the Editor:

Artificial Radioactivity Produced by Cosmic Rays . . . . . W. E. Ramsey, C. G. Montgomery and D. D. Montgomery 196
Kinetic Theory of the Motion of Ions in Gases . . . . . F. B. Pidduck 197
Heavy Beta-Rays from RaE . . . . . G. E. M. Jauncey 197
Excited States of the Alpha-Particle . . . . . H. Margenau 198
Magnetic Interaction in Heusler Alloy . . . . . L. W. McKeehan 199
On the Lower Bounds of Weinstein and Romberg in Quantum Mechanics . . A. F. Stevenson 199
On the Determination of Single Crystal X-Ray Diffraction Patterns from Two-Crystal Spectrometer Rocking Curves . . . . . Franklin Miller, Jr. and Lyman G. Parratt 200

Proceedings of the American Physical Society:

CHICAGO MEETING, November 26–27, 1937; Minutes and Abstracts 1–33; Author Index . . . 201
STANFORD MEETING, December 17–18, 1937; Minutes and Abstracts 1–31; Author Index . . 210

February 1, 1938

New Evidence as to the Nature of the Incoming Cosmic Rays, Their Absorbability in the Atmosphere, and the Secondary Character of the Penetrating Rays Found in Such Abundance at Sea Level and Below . . . . . I. S. Bowen, R. A. Millikan and H. Victor Neher 217
Neutrons from Lithium Plus Deuterons . . . . . W. E. Stephens 223
Slow Neutron Disintegration of B^{10} and Li^6 . M. Stanley Livingston and J. G. Hoffman 227
Photodisintegration of the Deuteron by the Gamma-Radiation from Na^{24} . . . . . J. Reginald Richardson and Lorenzo Emo 234
Scattering of Protons by Protons . . L. R. Hafstad, N. P. Heydenburg and M. A. Tuve 239
4.3μ Fundamental Band in the Spectrum of CO_2 . . . . . Donald M. Cameron and Harald H. Nielsen 246
Seventh Spectrum of Chlorine (Cl VII) . . . . . L. W. Phillips 248
Electrical Behavior of Thin Metallic Films Condensed at Low Temperatures . . . . . H. Rees Mitchell 250
Static Universe and Nebular Red Shift. II . . . . . S. Sambursky and M. Schiffer 256

Letters to the Editor:

Vectorial Photoelectric Effect in Barrier-Layer Cells . . . . . Robert G. Wilson 264
Evidence Against the Existence of Heavy Beta-Particles . Arthur Ruark and Creighton C. Jones 264
Heavy Beta-Rays—More Theory and Experimental Evidence . . . . . G. E. M. Jauncey 265
Evidence for a Particle of Intermediate Mass . . . . . Arthur J. Ruhlig and H. R. Crane 266
Analysis of Neutron Absorption in Boron . . . . . Henry C. Torrey 266

February 15, 1938

Long Period Activity of Indium Produced by Slow Neutrons . . . Allan C. G. Mitchell 269
Note on *K* Electron Capture and Isomerism in Radiosilver . . . . . M. L. Pool and Edward C. Campbell 272
X-Ray Spectroscopic Data in Regard to the Electronic Energy Bands in Potassium and Sodium Chlorides . . . . . Joseph Valasek 274
Effect of Temperature on the Atomic Distribution in Liquid Sodium . . . . . Frank H. Trimble and Newell S. Gingrich 278
Isotopic Constitution of Calcium, Titanium, Sulphur and Argon . . . . Alfred O. Nier 282
Photoelectric Sensitization of Aluminum . . . . . Louis P. Thein 287
Effect of Cathode Material on the Second Townsend Coefficient for Ionization by Collision in Pure and Contaminated N_2 Gas . . . . . W. E. Bowls 293
Magnetic Interaction in Homogeneously Strained Ferromagnetic Crystals . L. W. McKeehan 301
Magnetic Interaction in Pyrrhotite and in Magnetite . . . . . L. W. McKeehan 307
Van der Waals Forces Between Symmetrical Rotators . . . . . Kenneth G. Carroll 310
Binding Energy of the Deuteron . . . . . H. A. Bethe 313

Letters to the Editor:

Intrinsic Variability of the So-Called Fundamental Physical Constants . . . . . F. Zwicky 315
Modified High Speed Geiger Counter Circuit . . . . . H. V. Neher and W. H. Pickering 316
Multivibrator Geiger Counter Circuit . . . . . Arthur Ruark 316
Note on the Existence of Heavy Beta-Rays . . . . . H. R. Crane 317
New Method of Measuring Nuclear Magnetic Moment . . . . . I. I. Rabi, J. R. Zacharias, S. Millman and P. Kusch 318
Heavy Electrons from Radium E—Discussion of the Evidence . . . . . G. E. M. Jauncey 319
On Magnetic Anisotropy in Ferromagnetic Crystals in Weak Fields . . . . . E. Kondorsky 319

Proceedings of the American Physical Society:

INDIANAPOLIS MEETING, December 28–30, 1937; Minutes and Abstracts 1–64 321

March 1, 1938

Cosmic-Ray Intensities at Great Depths . . . . . Volney C. Wilson 337
Photoelectric Ionization in the Ionosphere . . . . . E. O. Hulburt 344
Emission of Neutrons from Argon, Chlorine, Aluminum and Some Heavier Elements Under Alpha-Particle Bombardment . . . . . Ernest Pollard, Howard L. Schultz and Gordon Brubaker 351
Improved Method for the Determination of the Specific Charge of Beta-Particles . . . . . C. T. Zahn and A. H. Spees 357
Specific Charge of Disintegration Electrons from Radium E . C. T. Zahn and A. H. Spees 365
Further Observations on the Production of N^{13} . . R. B. Roberts and N. P. Heydenburg 374
Rotational Energy Distribution of OH Molecules from the λ3064 Band . . . . . Elisabeth Reed Lyman 379
On the Nuclear Moments of Indium . . . S. Millman, I. I. Rabi and J. R. Zacharias 384
Focusing and Maximum Energy of Ions in the Cyclotron . . . . . M. E. Rose 392
Magnetic and Electrostatic Focusing in the Cyclotron . . . . . Robert R. Wilson 408
Nonideal Lloyd's Mirror in Wide-Angle Interference . . . . . F. W. Doermann 420
Van der Waals Forces in Helium . . . . . Chester H. Page 426

Letters to the Editor:

Alternative Interpretation of Jauncey's "Heavy Electron" Spectra . . . Arthur H. Compton 431
Heavy Beta-Particles? . . . . . C. T. Zahn 431
Ferromagnetic Impurities . . . . . F. W. Constant and J. M. Formwalt 432
Scattering of Cosmic-Ray Particles . . . . . E. J. Williams 433
Cosmic Radiation and Electrical Conductivity in the Stratosphere . O. H. Gish and K. L. Sherman 434
Effect of Chemical Combination on the $K\alpha_{1,2}$ Line of Sodium . . . . . N. G. Johnson 434

March 15, 1938

Radioactivity Induced in the Rare Earth Elements by Fast Neutrons . . . . . M. L. Pool and L. L. Quill 437
Proton Induced Radioactivities . L. A. DuBridge, S. W. Barnes, J. H. Buck and C. V. Strain 447
Cloud Chamber Evidence Against the Existence of Heavy Beta-Particles . . . . . Arthur Ruark and Creighton C. Jones 454
Theory of the Continuous X-Ray Spectrum Near the Duane-Hunt Limit . Eugene Brunner 457
Fine Structure of the Nuclear Ground Level of Li^7 . . . . . G. Breit and J. R. Stehn 459
On Nuclear Magnetic Moments . . . . . D. R. Inglis 470
First Spark Spectrum of Manganese . . . . . C. W. Curtis 474
Domain Theory of Ferromagnetics Under Stress. Part II. Magnetostriction of Polycrystalline Material . . . . . William Fuller Brown, Jr. 482

Letters to the Editor:

Minimum Neutron Energy to Produce Neutron Loss Process and Its Application to the Measurement of Q Values . . . . . R. Sagane 492
On the Albedo of Slow Neutrons . . . . . E. Fermi, E. Amaldi and G. C. Wick 493
Evidence of a Periodic Deviation from the Schottky Line for Tungsten . . . . . R. L. E. Seifert and T. E. Phipps 493
Nature of the Penetrating Component of the Cosmic Radiation . . . . . R. M. Langer 494
Magnetic Moments of $_3Li^6$, $_3Li^7$ and $_9F^{19}$. I. I. Rabi, S. Millman, P. Kusch and J. R. Zacharias 495
Evidence for a Band System of Antimony Nitride . . . . . Nettie H. Coy and H. Sponer 495
Further Evidence Against Heavy Beta-Particles . . . Arthur Ruark and Creighton C. Jones 496
Energy of the Neutrons from the Disintegration of Carbon by Deuterons . . . T. W. Bonner 496

APRIL 1, 1938

Intensity of the Primary Cosmic Radiation and Its Energy Distribution . THOMAS H. JOHNSON 499
Radioactivity of Potassium . . . . . ARTHUR BRAMLEY AND A. KEITH BREWER 502
Nuclear Isomers of In^{116} . . . . . ALLAN C. G. MITCHELL AND LAWRENCE M. LANGER 505
Critical Analysis of the Classical Experiments on the Relativistic Variation of Electron Mass . . . . . C. T. ZAHN AND A. H. SPEES 511
New Mass Spectrometer with Improved Focusing Properties . . . . . WALKER BLEAKNEY AND JOHN A. HIPPLE, JR. 521
Dissociation of Ethane by Electron Impact . . . . . JOHN A. HIPPLE, JR. 530
X-Ray and Optical Properties of Barium-Copper-Stearate Films . . . CLIFFORD HOLLEY 534
Focusing of an X-Ray Beam by a Rocksalt Crystal . R. M. BOZORTH AND F. E. HAWORTH 538
Emission of Radiation in the Positive Column of a Mercury Arc . . . . . BENTLEY T. BARNES AND ELLIOT Q. ADAMS 545
Mechanism of the Positive Column in Mercury Vapor at Intermediate Pressures . . . . . ELLIOT Q. ADAMS AND BENTLEY T. BARNES 556
Signs of the Nuclear Magnetic Moments of Li^6 and K^{41} . . . . . JOHN E. GORHAM 563
Term Values in Carbon . . . . . C. W. UFFORD 568
Photoelectric and Thermionic Investigations of Thoriated Tungsten Surfaces . ALLEN KING 570
Force on the Cathode of a Copper Arc . . . . . RANDAL M. ROBERTSON 578
Internal Friction in Solids. IV. Relation Between Cold Work and Internal Friction . . . . . CLARENCE ZENER 582
Effect of Hydrostatic Pressure on the Susceptibility of Rochelle Salt . DENNISON BANCROFT 587
On Eddington's Treatment of Dirac's Equation . . . . . BORIS PODOLSKY 591
Nuclear Energy Sources and Stellar Evolution . . . . . G. GAMOW 595

Letters to the Editor:

Improvement in Geiger-Müller Tube Design . . . . . J. L. LAWSON AND A. W. TYLER 605
Electron Capture and Internal Conversion in Gallium 67 . . . . . LUIS W. ALVAREZ 606
Suggestion Regarding the Nature of the Heavy Electron . . . . . IRA M. FREEMAN 606
On the Latitude Effect of the Soft Component of Cosmic Rays . . . . . BERNHARD GROSS 607
Rate of Selective Thermonuclear Reactions . . . . . G. GAMOW AND E. TELLER 608
Multiple States in the High Pressure Discharge . . . . . C. G. SUITS 609
Concentration of Radiohalides, and Failure to Observe Gamma-Rays from I^{128} . . . . . ARTHUR ROBERTS AND JOHN W. IRVINE, JR. 609
Gamma-Radiation from N^{13} . . . . . J. REGINALD RICHARDSON 610
Change and Exchange of Rest Mass of Elementary Particles During Collisions . . F. ZWICKY 611
Isomers of Radioindium . . . . . M. L. POOL 611
Another Circuit for Use with Geiger-Müller Counters . . . . . E. W. YETTER 612

Proceedings of the New England Section of the American Physical Society:

NEW HAVEN MEETING, January 15, 1938; Minutes 613

APRIL 15, 1938

Cosmic-Ray Ionization in the Neighborhood of a Lead Block . . . EDWIN G. SCHNEIDER 615
Absorption of High Energy Electrons. Part III . . . . A. J. RUHLIG AND H. R. CRANE 618
Disintegration of the Deuteron by Alpha-Particles . . . . . H. L. SCHULTZ 622
Gamma-Radiation from Boron Bombarded by Protons . . . . . W. A. FOWLER, E. R. GAERTTNER AND C. C. LAURITSEN 628
Note on Boron Plus Proton Reactions . . . . . J. R. OPPENHEIMER AND R. SERBER 636
Spectra of the Monoxides of Cerium and Praseodymium . . . . WILLIAM W. WATSON 639
Electrostatic Generator Operating Under High Air Pressure—Operational Experience and Accessory Apparatus . . . . . D. B. PARKINSON, R. G. HERB, E. J. BERNET AND J. L. MCKIBBEN 642
On the Electromagnetic Properties of Nuclear Systems . W. E. LAMB, JR. AND L. I. SCHIFF 651
Self-Consistent Field for Iron . . . . . MILLARD F. MANNING AND LEO GOLDBERG 662

Letters to the Editor:

Demonstration of the Existence of Permanent Volume Polarization in Certain Types of Multilayers . . . . . Roy W. Goranson and W. A. Zisman 668
Thermal Expansion of the Alkalis . . . . . Lewis Balamuth 669
Heavy Beta-Rays? . . . . . G. E. M. Jauncey 669
Role of Oxidation in Arc Cathode . . . . . C. G. Suits and J. P. Hocker 670
Seasonal Variation in F_2 Ionization . . . . . E. O. Hulburt 670
Improved Wigner-Seitz Method for the Calculation of Electronic Energy Bands . . G. Wannier 671
Absolute Measurement of Resistance and Reactance at Frequencies of the Order 300 mC/second . . . . . R. A. Chipman 672
Rotational Transitions Associated with Radiation in Water Molecules in Nonpolar Solvents . . . . . J. W. Ellis and E. L. Kinsey 672
Note on Numerical Integration . . . . . Millard F. Manning and Jacob Millman 673
On the Penetrability of a Simple Type of Potential Barrier . . . . . F. C. Hoyt 673
Comparison of Intensities of Spectral Lines . . . . Donald Foster and H. W. Highriter 673

Proceedings of the American Physical Society:

NEW YORK MEETING, February 25–26, 1938; Minutes and Abstracts 1–71 674

Proceedings of the Metropolitan Section of the American Physical Society, March 25, 1938 . 690

MAY 1, 1938

Rate of Production of Very Large Cosmic-Ray Bursts as a Function of Lead Shielding Thickness . . . . . William P. Jesse and Richard L. Doan 691

New Analysis of Cosmic Radiation Including the Hard Component . . L. W. Nordheim 694

Fast Neutrons . . . . . M. L. Pool 707

Formation of an Excited He^3 in the Disintegration of Deuterium by Deuterons . T. W. Bonner 711

Energy-Range Relations for Deuterons, Protons and Alpha-Particles . . . . . F. T. Rogers, Jr. and Marguerite M. Rogers 713

Magnetic Field Corrections in the Cyclotron . . . . . M. E. Rose 715

Some Experiments on the Magnetic Properties of Free Neutrons . . . . . O. R. Frisch, H. von Halban, Jr. and Jørgen Koch 719

Isotopic Constitution of Gadolinium, Dysprosium, Erbium and Ytterbium . A. J. Dempster 727

On the Sensitivity of the Balanced Space Charge Method for Detecting Ionization of Gases by Collision of Ions and Atoms . . . . . Antonio Rostagni 729

Sensitivity of the Balanced Space Charge Positive Ion Detector . . . Robert N. Varney 732

Quadrupole-Quadrupole Interatomic Forces . . . . . Julian K. Knipp 734

Process of Diffusion in a Centrifugal Field of Force . . . . . William J. Archibald 746

Accidental Coincidences in Counter Circuits . . . Carl Eckart and Francis R. Shonka 752

Magnetic Structure of Cobalt . . . . . W. C. Elmore 757

Letters to the Editor:

Radio Isotopes of Nickel . . . . . J. J. Livingood and G. T. Seaborg 765
Drift of Adsorbed Th on W Filaments Heated with d.c. . . . . R. P. Johnson 766
On the Form of the β-Spectrum of Ra E in the Vicinity of the Upper Limit and the Mass of the Neutrino . . . . . A. I. Alichanian, A. I. Alichanow and B. S. Dželepow 766
Shape of the β-Spectrum of Th C and the Mass of the Neutrino . . . . . A. I. Alichanian and S. J. Nikitin 767
Note on Atmospheric Absorption Caused by the Rotational Water Band . . . . W. M. Elsasser 768
Recalescence in Uranium . . . . . W. L. Hole, R. Wright and H. B. Wahlin 768
Cosmic Rays; Barometric Effect, Variations of Second Kind and Disturbances Produced by the Earth's Magnetic Field . . . . . W. Kolhörster 768
Artificial Radioactivity Produced by Protons . . . . . Louis N. Ridenour, L. A. Delsasso, M. G. White and Rubby Sherr 770
Concentration of Radioactive Copper by Use of a High Speed Rotating Cathode . Joseph Steigman 771

MAY 15, 1938

Specific Ionization and Mass of Cosmic-Ray Particles . . . DALE R. CORSON AND ROBERT B. BRODE 773
On the Rotation of the Atomic Nucleus . . . . . E. TELLER AND J. A. WHEELER 778
New Experimental Evidence for the Existence of a Neutrino . H. R. CRANE AND J. HALPERN 789
Elastic and Inelastic Scattering of Fast Neutrons . . D. C. GRAHAME AND G. T. SEABORG 795
Experimental Verification of the Quantum-Mechanical Dispersion Theory by Reflection and Diffuse Scattering of X-Rays from Zinc . . . . . W. A. BRUCE 802
Band Spectra of SrCl and SrH . . . . . KENNETH R. MORE AND S. D. CORNELL 806
On the Saturation of Nuclear Forces . . . . . C. CRITCHFIELD AND E. TELLER 812
Electrical Oscillations of a Prolate Spheroid. Paper I . . . . . LEIGH PAGE AND NORMAN I. ADAMS, JR. 819
Statistical Theory of a Scaling Circuit . . . LEON ALAOGLU AND NICHOLAS M. SMITH, JR. 832
Electromagnetic and Gravitational Radiation . . . . . L. INFELD 836

Letters to the Editor:

Magnetic Moment of Li^7 in the α-Particle Model . . . . . H. A. BETHE 842
Radial Lines in Laue Spot Photographs . . . . . A. P. R. WADLUND 843
Comments on the Article by A. P. R. Wadlund: Radial Lines in Laue Spot Photographs . . . . . W. H. ZACHARIASEN 844
Gamma-Radiation from Proton Bombardment of Carbon . . . . . M. E. ROSE 844
Low Temperature Thermal Source of Li Ions . . . . . HOFF LU 845
Note on the Range of Occurrence of Stable Isotopes . . . . . HARRISON BROWN 846
Relation Between Atomic Number and Isotopic Number for Stable Isotopes . . . . . G. E. GIBSON AND HARRISON BROWN 846
Long-Lived Radio Cobalt Isotopes . . . . . J. J. LIVINGOOD AND G. T. SEABORG 847
Erratum: Ferromagnetic Anisotropy of Nickel-Iron Crystals at Various Temperatures . J. D. KLEIS 848
On the Penetrating Component of the Cosmic Radiation . . . . J. BARNÓTHY AND M. FORRÓ 848

Program of Research Papers at the Annual Meeting of the Southeastern Section of the American Physical Society, Tuscaloosa, Alabama, April 1 and 2, 1938 849
Organization Meeting of the New York State Section of the American Physical Society, Union College, Schenectady, April 2, 1938 853

JUNE 1, 1938

New Light on the Nature and Origin of the Incoming Cosmic Rays . . . . . I. S. BOWEN, R. A. MILLIKAN AND H. VICTOR NEHER 855
Influence of the Solar Magnetic Field Upon Cosmic Rays . . . . . PAUL S. EPSTEIN 862
Loss of Neutrons by Neutron Bombardment and the Radioactive Isotopes of Scandium . . . . . J. M. CORK AND R. L. THORNTON 866
Energy Content of the Heavy Nuclei . . . . . A. J. DEMPSTER 869
Excited States of the H^3 and He^4 Nuclei . . . . . SIMON S. SHARE 875
Nuclear Magnetic Moment of Li^7 by Perturbation Theory . . . . . D. R. INGLIS 880
Low Terms in Co VI . . . . . I. S. BOWEN 889
Absorption Spectrum of Caesium Hydride . . . . . G. M. ALMY AND M. RASSWEILER 890
Some Photoelectric Properties of Evaporated Bismuth Films . . . . ALFRED H. WEBER 895
Reflection of Sound . . . . . KARL F. HERZFELD 899

Letters to the Editor:

Tracks of Stellar Evolution . . . . . G. GAMOW 907
On the Nature of the Penetrating Cosmic Rays . . . . . VOLNEY C. WILSON 908
On the Structure of "Built-Up" Films on Metals . . . . . I. FANKUCHEN 909
On the Structure of "Built-Up" Films on Metals . . . . J. J. BIKERMAN AND J. H. SCHULMAN 909
On the Mathematical Formalism of the Theory of Showers . . D. IWANENKO AND A. SOKOLOW 910
Intense Monochromatic Beams of X-Rays . . . . . I. FANKUCHEN 910
Effect of Oxides and Impurities on Metallic Arc Reignition . . . . . J. D. COBINE 911
Contact Potential of Solid Films Formed by Evaporation and by Solidification and of Built-Up Multilayers on Metals . . . . . WILLIAM D. HARKINS AND RICHARD W. MATTOON 911

Proceedings of the American Physical Society:

WASHINGTON MEETING, April 28–30, 1938; Minutes and Abstracts 1–184. 913

JUNE 15, 1938

Multiplicative Theory of Showers as Applied to Large Bursts of Cosmic-Ray Ionization . . . . . C. G. MONTGOMERY AND D. D. MONTGOMERY 955
Transition Effects of Cosmic Rays in the Atmosphere . . . . . H. SNYDER 960
Atomic Vibrations of a Zn-Cu Alloy . . . . . ROBERT A. HOWARD 966
Determination of the Characteristic Temperature of MgO from X-Ray Measurements . . . . . H. S. RIBNER AND E. O. WOLLAN 972
Intensity Relations in the Low Voltage Helium Arc . . . . . JOHN J. HEILEMANN 977
Infra-Red Absorption by $C^{13}O_2^{16}$ at 4.375μ . . . . . ALVIN H. NIELSEN 983
Energy Loss of Positive Electrons in Passing Through Aluminum . . . . . B. R. CURTIS 986
Calculations on a New Neutron-Proton Interaction Potential . . . . . R. G. SACHS AND M. GOEPPERT-MAYER 991
Scattering of Fast Electrons in Gases . . . . . J. B. HORNER KUPER 993
Saturation Requirements for Nuclear Forces . . . . . G. BREIT AND E. WIGNER 998
Thermal Conductivities of Mercury, Sodium, and Sodium Amalgams in the Liquid State . . . . . WAYNE C. HALL 1004
Internal Friction in Solids. V. General Theory of Macroscopic Eddy Currents . . . . . CLARENCE ZENER 1010

Letters to the Editor:

Scattering of Neutrons by Deuterons . . . . . P. G. KRUGER, W. E. SHOUPP, R. E. WATSON AND F. W. STALLMANN 1014
Molecule of Sulphur and Its Raman Spectrum . . . . . S. BHAGAVANTAM 1015
Radioactive Iodine Isotopes . . . . . J. J. LIVINGOOD AND G. T. SEABORG 1015
Radioactivity of Be^7 . . . . . R. B. ROBERTS, N. P. HEYDENBURG, G. L. LOCHER 1016
Transmutations of the Cosmic-Ray Electrons and the Nuclear Forces . . . . . IG. TAMM 1016
Excitation of Nuclei by Bombardment with Charged Particles . . . . . V. F. WEISSKOPF 1018
Heavy Electrons and β-Decay . . . . . F. L. ARNOT 1018
Some Results of the Search for Super-Novae . . . . . F. ZWICKY 1019
Angular Distribution of Slow Neutrons from a Paraffin Surface . . . . . J. G. HOFFMAN AND M. S. LIVINGSTON 1020
Radial Lines in Laue Spot Photograms . . . . . CHARLES S. BARRETT 1021
Magnetic Anisotropy of Ferromagnetic Crystals in Weak Fields and Reversible Susceptibility . . . . . E. KONDORSKY 1022

Author Index to Volume 53 1023
Analytic Subject Index to Volume 53 1037

Edw. L. Nichols.